TPB Degradation Study Status

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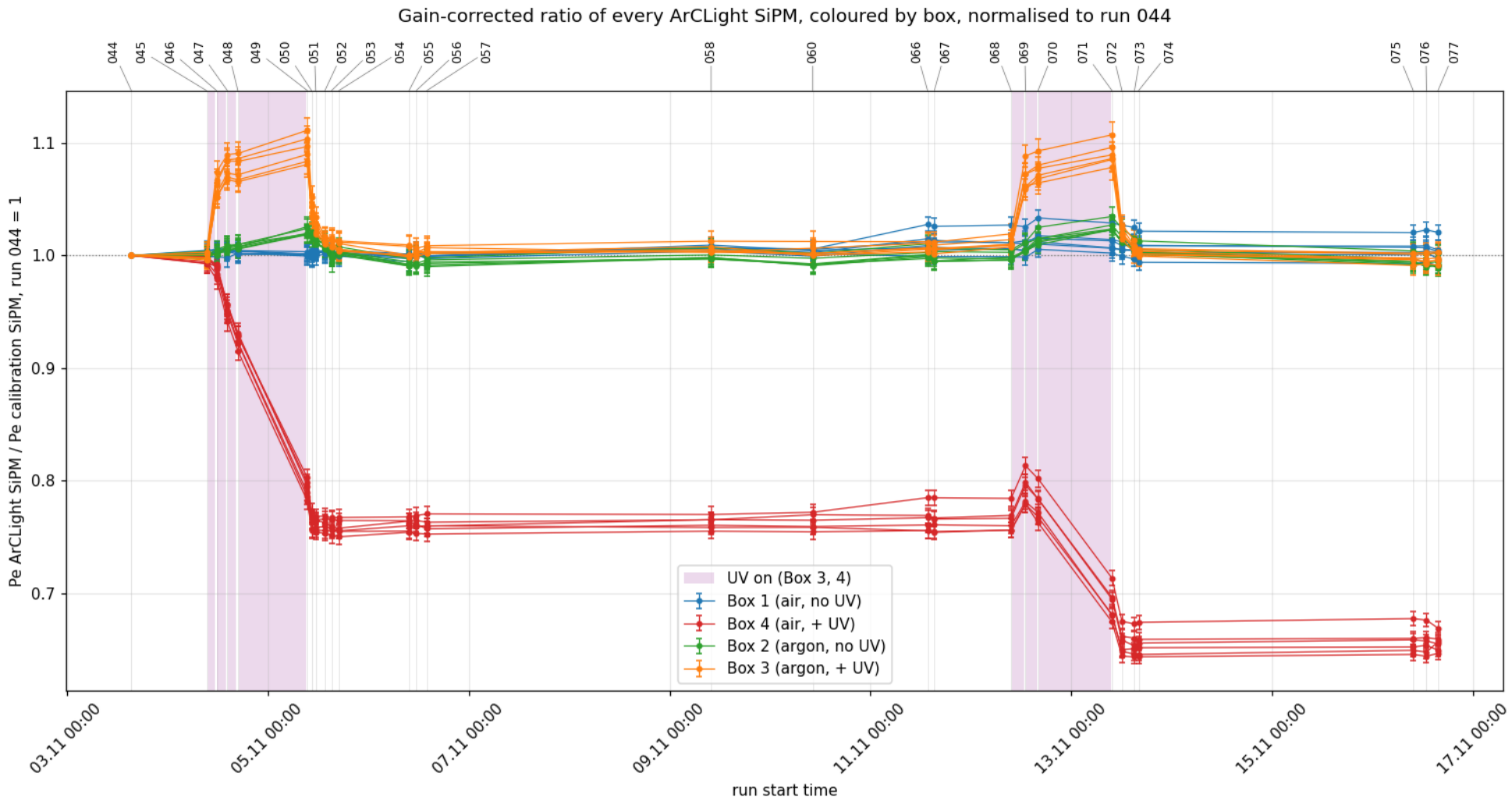
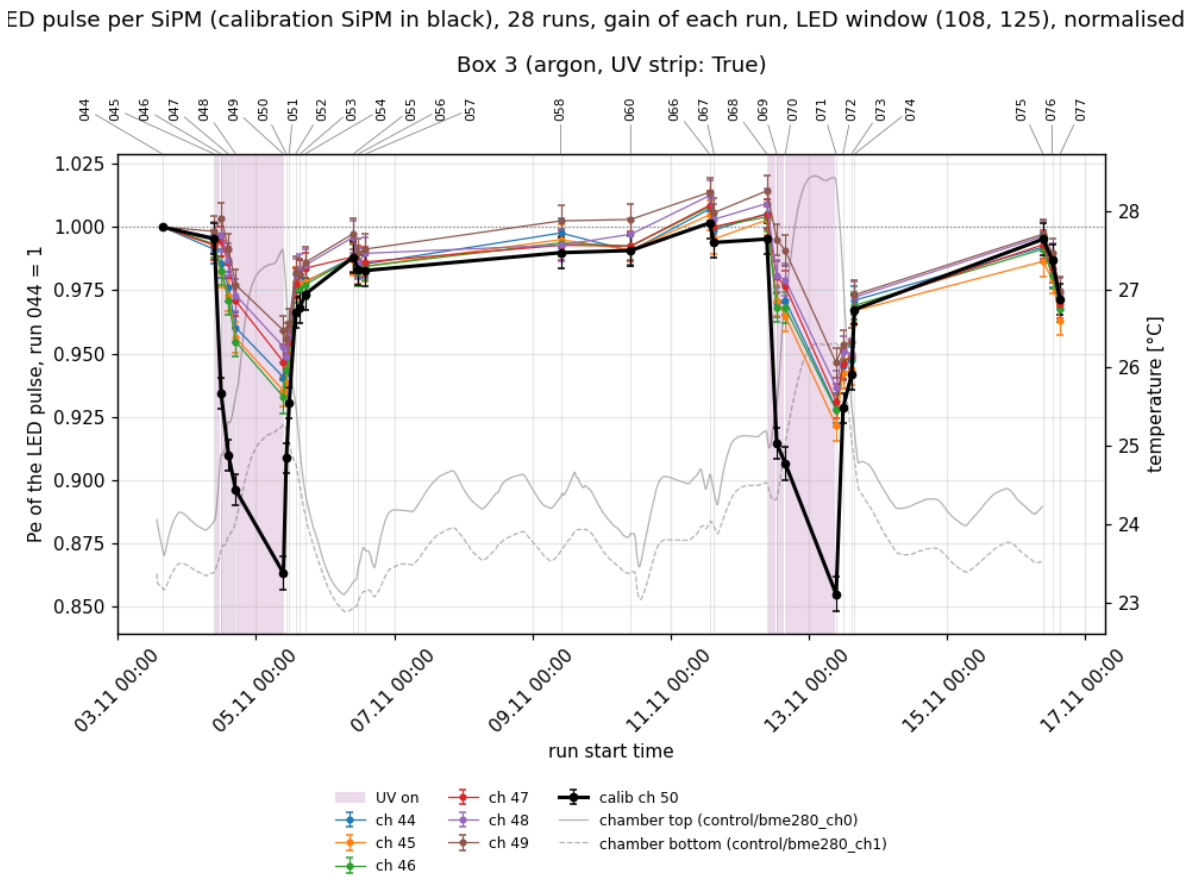
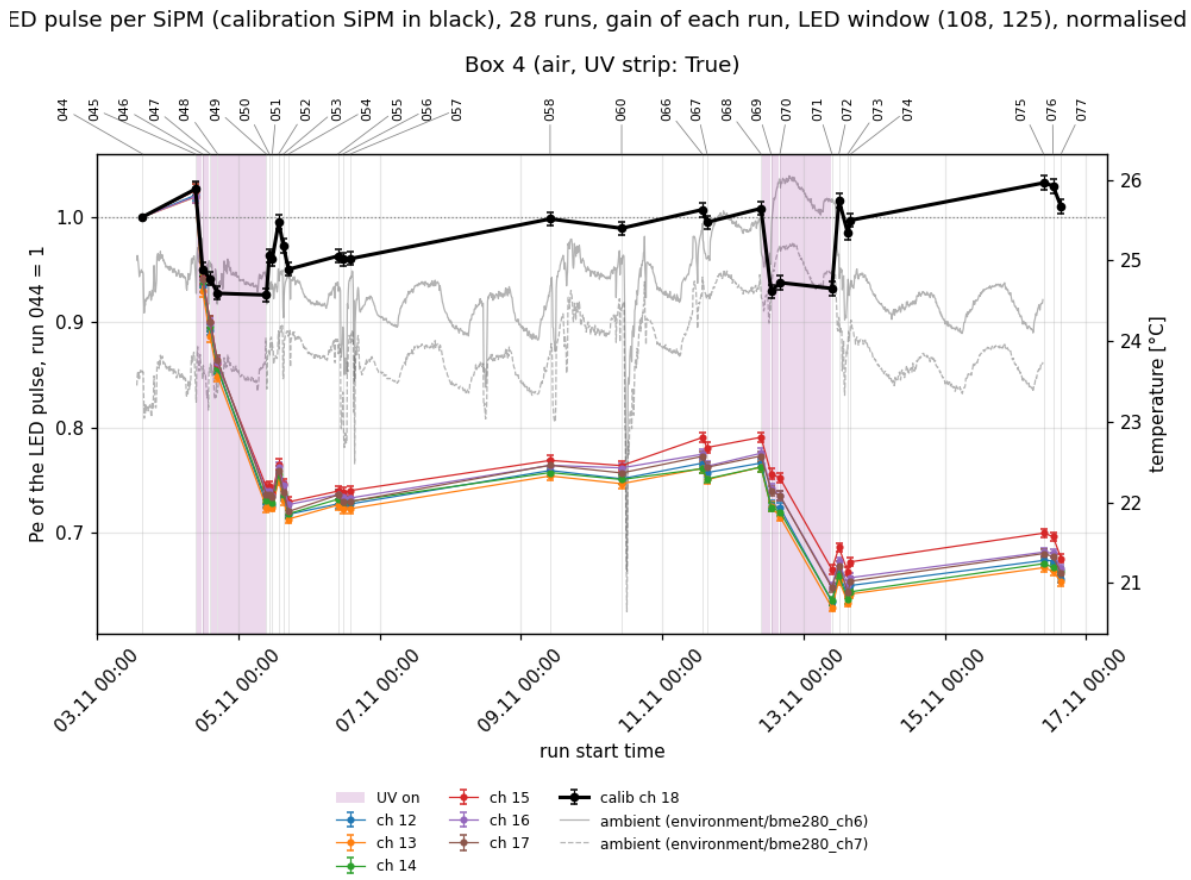
17.11.2026

Results (Gain-corrected ratio)

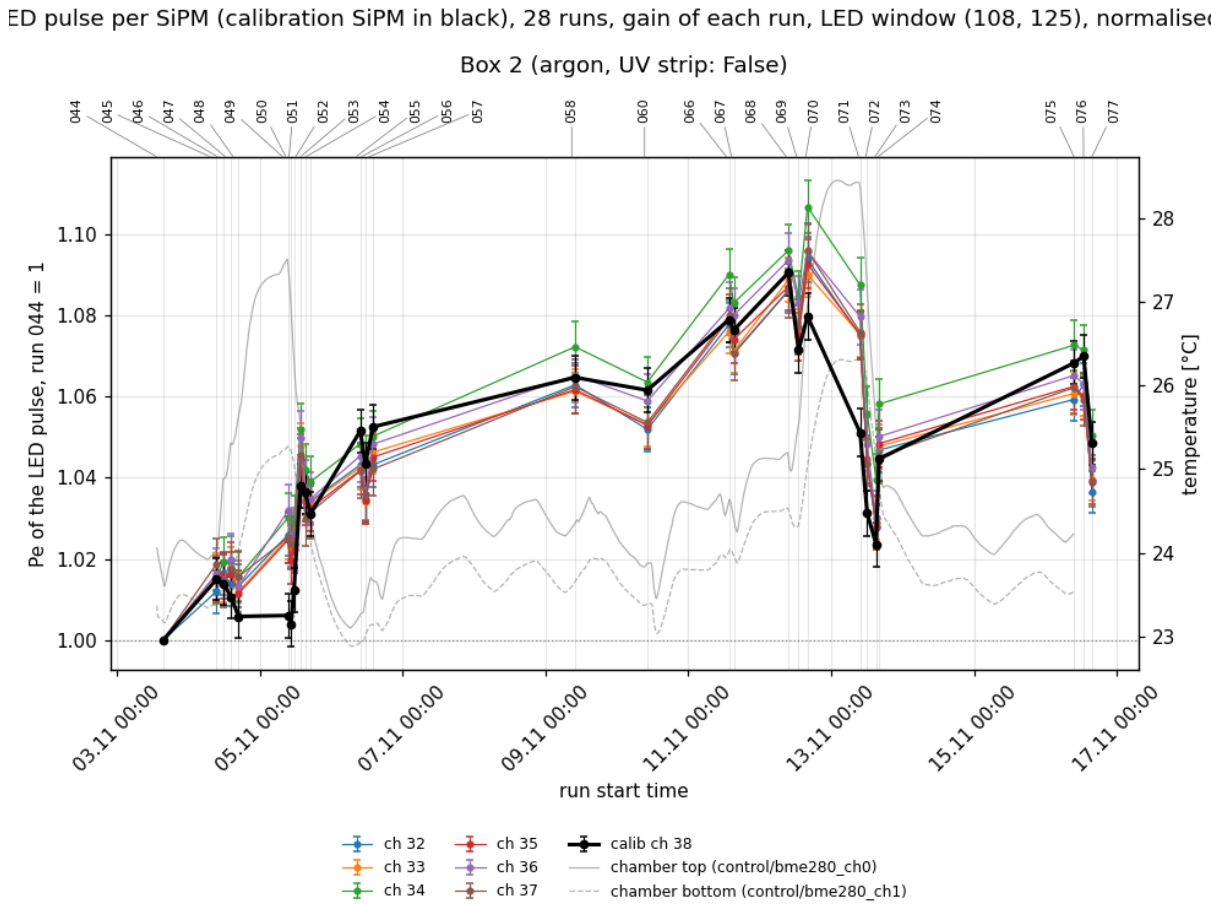


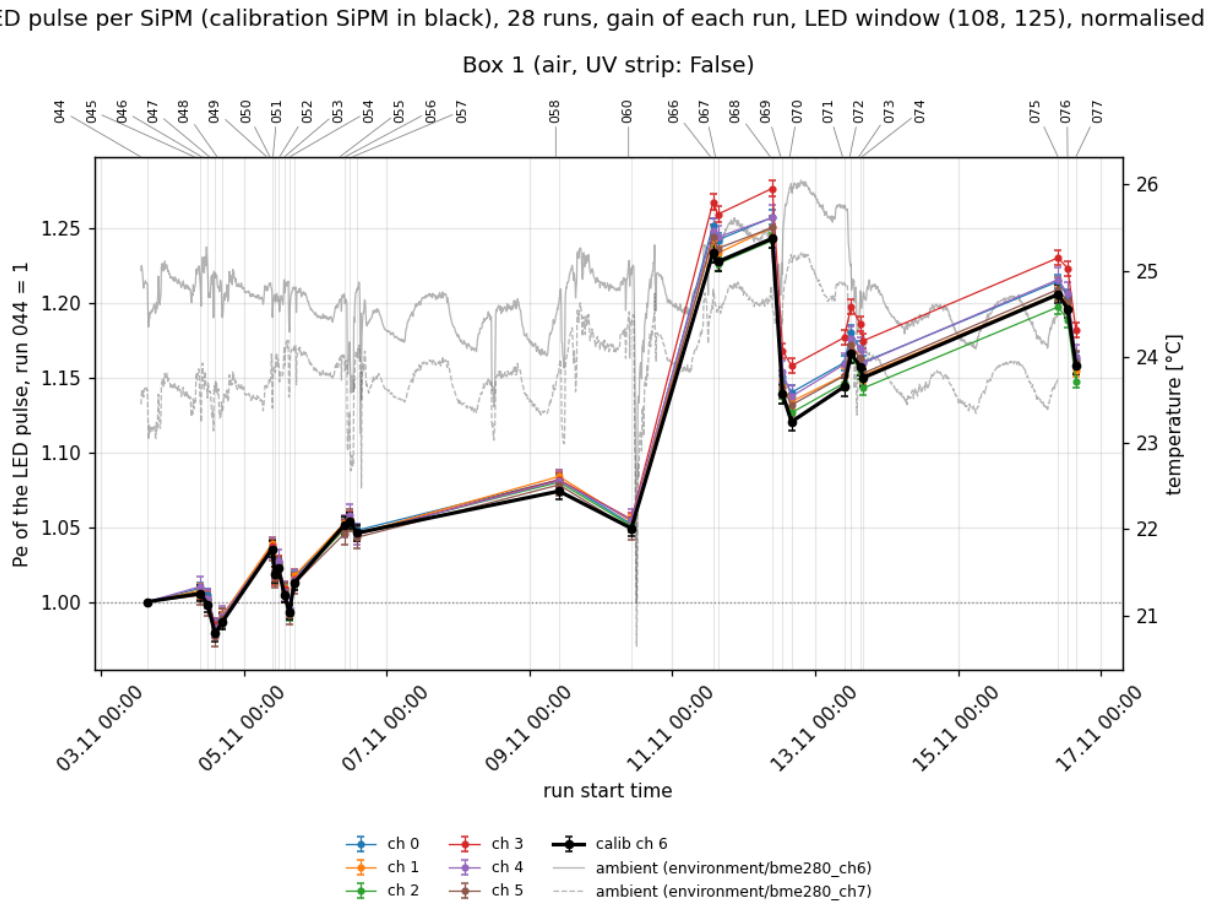
Results (PE of each Sipm, UV)



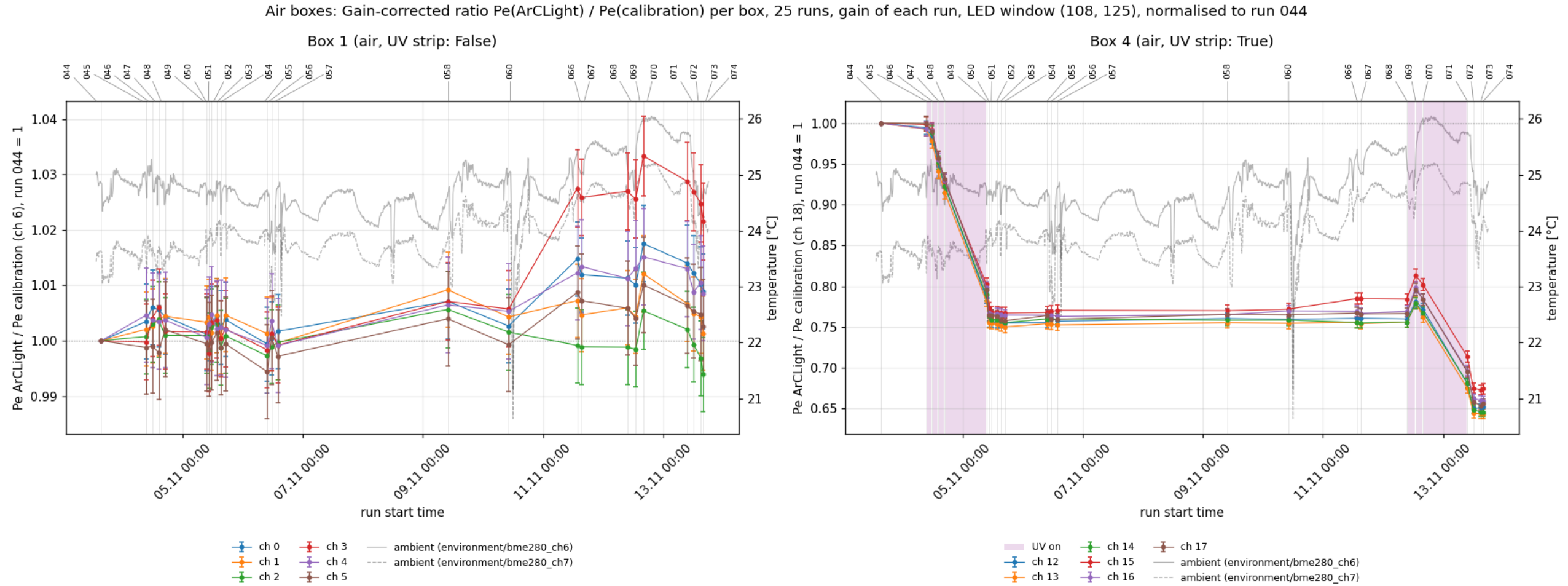


Results (PE of each Sipm, no UV)





One anomaly

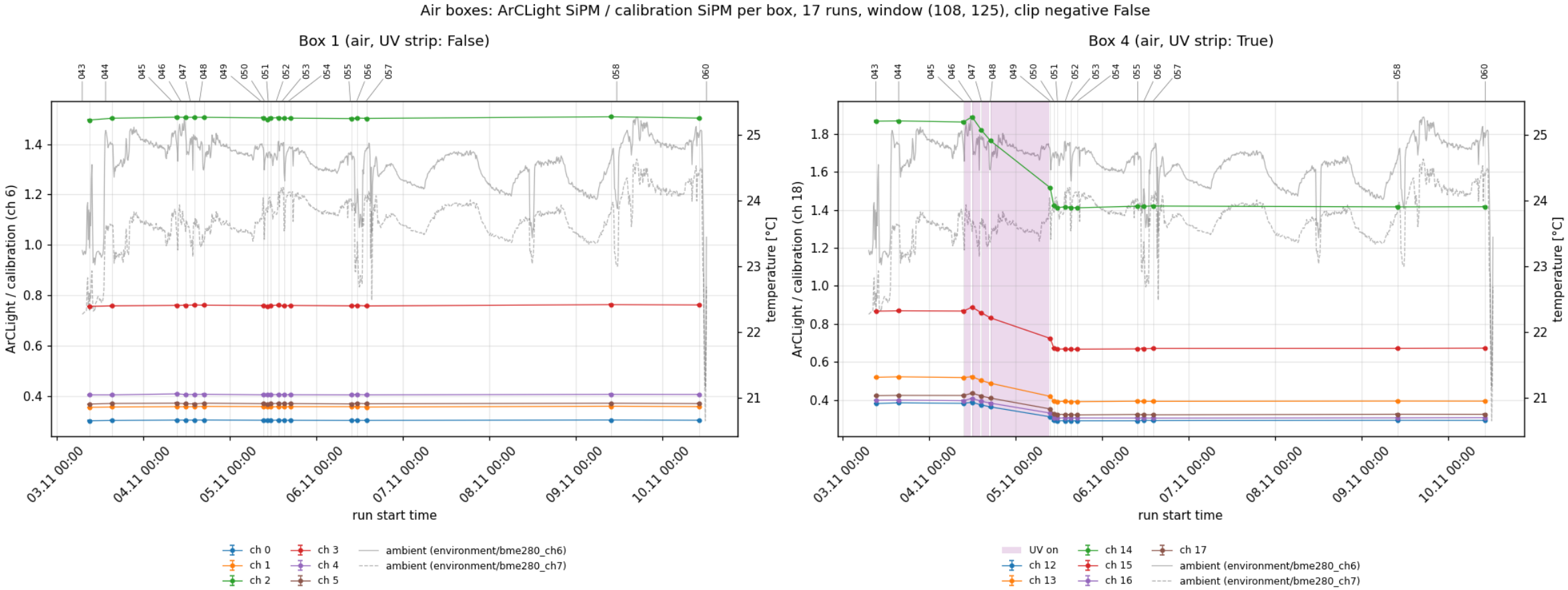

Air boxes: Gain-corrected ratio Pe(ArCLight) / Pe(calibration) per box, 25 runs, gain of each run, LED window (108, 125), normalised to run 044
Box 1 (air, UV strip: False)
Box 4 (air, UV strip: True)
Pe ArCLight / Pe calibration (ch 6), run 044 = 1
Pe ArCLight / Pe calibration (ch 18), run 044 = 1
temperature [°C]
run start time
05.11 00:00
07.11 00:00
09.11 00:00
11.11 00:00
13.11 00:00
ch 0
ch 1
ch 2
ch 3
ch 4
ch 5
ambient (environment/bme280_ch6)
ambient (environment/bme280_ch7)
UV on
ch 12
ch 13
ch 14
ch 15
ch 16
ch 17

Further plan

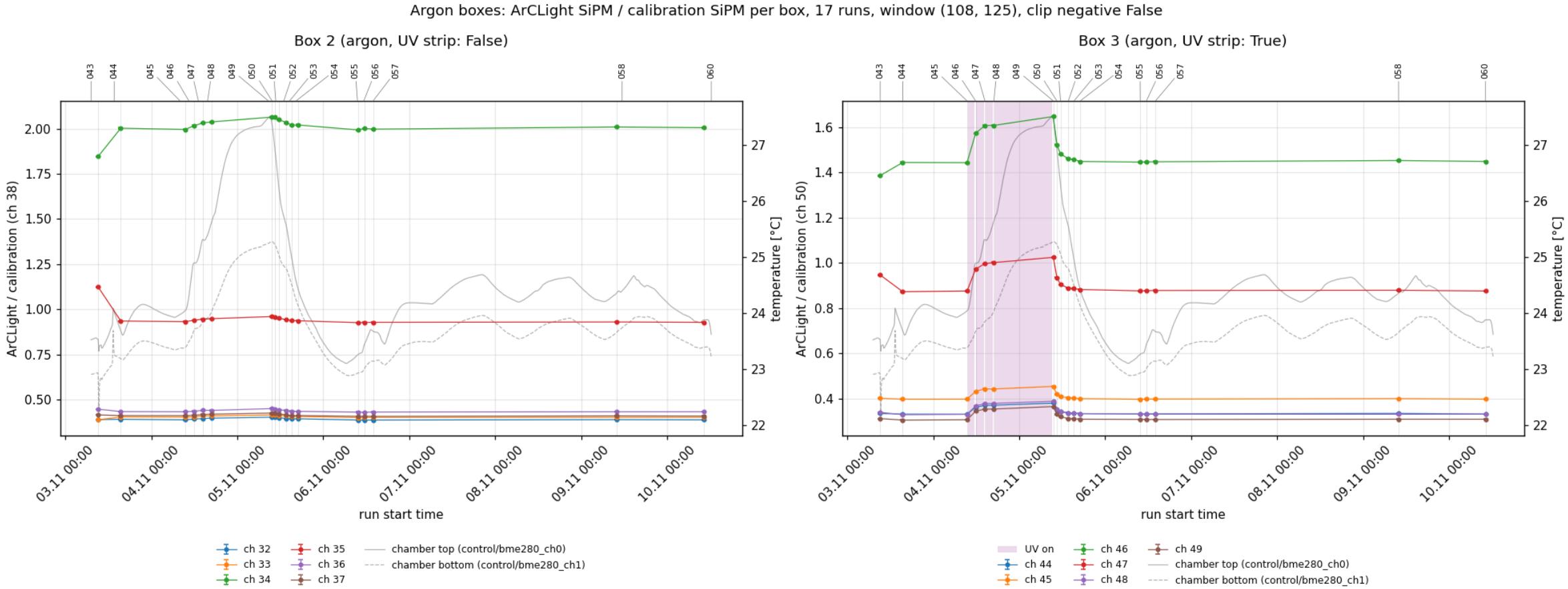
- 2D scan of ACLs (mainly the degraded one)
- Degradation via ambient light
  - Using the ACL (air, no UV) and let it sit with lid open, taking measurements over a period of time.
- Regeneration attempt
  - Putting the degraded ACL (air, UV) in vacuum chamber, pull vacuum, flush with argon, take measurements to see if there is regeneration.
- Writing!

Backup slides / Old slides

ADC integral ratios (Air)



ADC integral ratios (Argon)

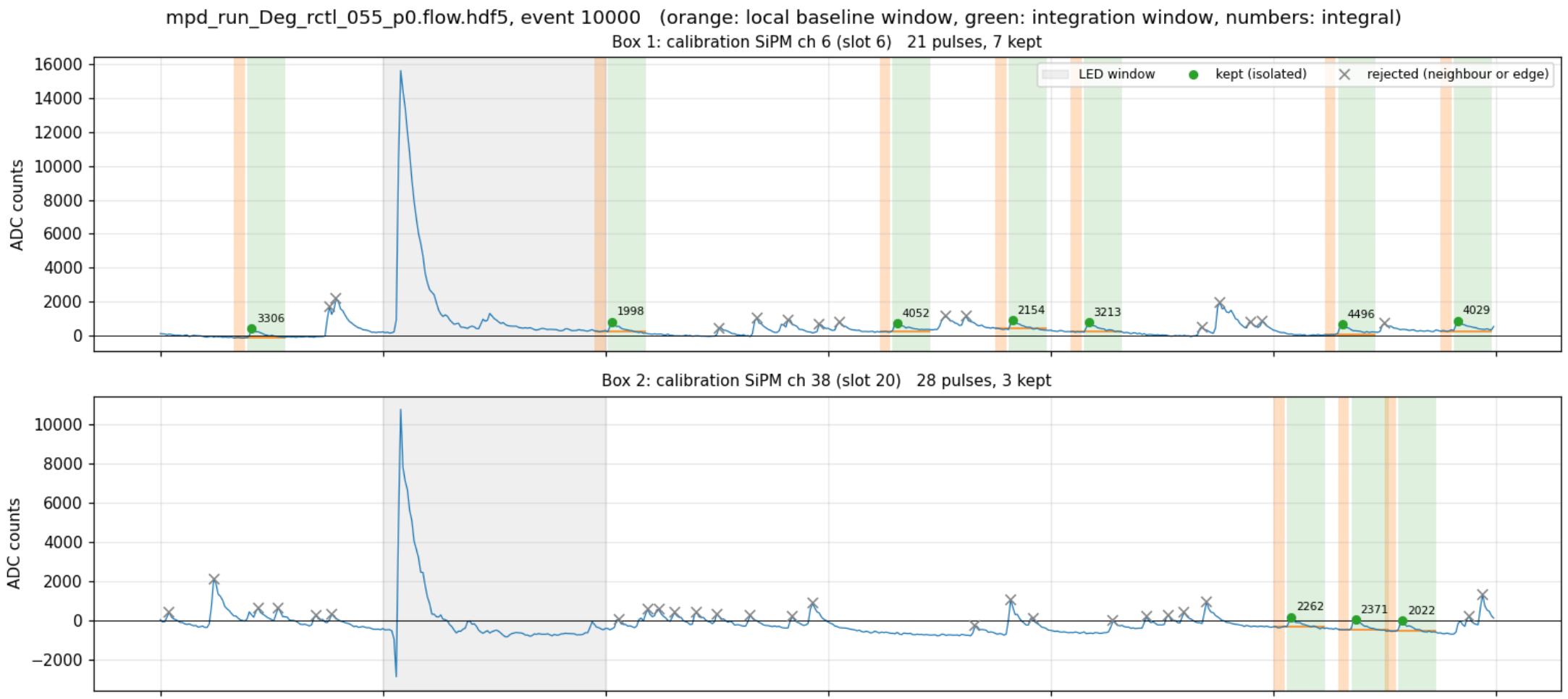


SiPM calibration

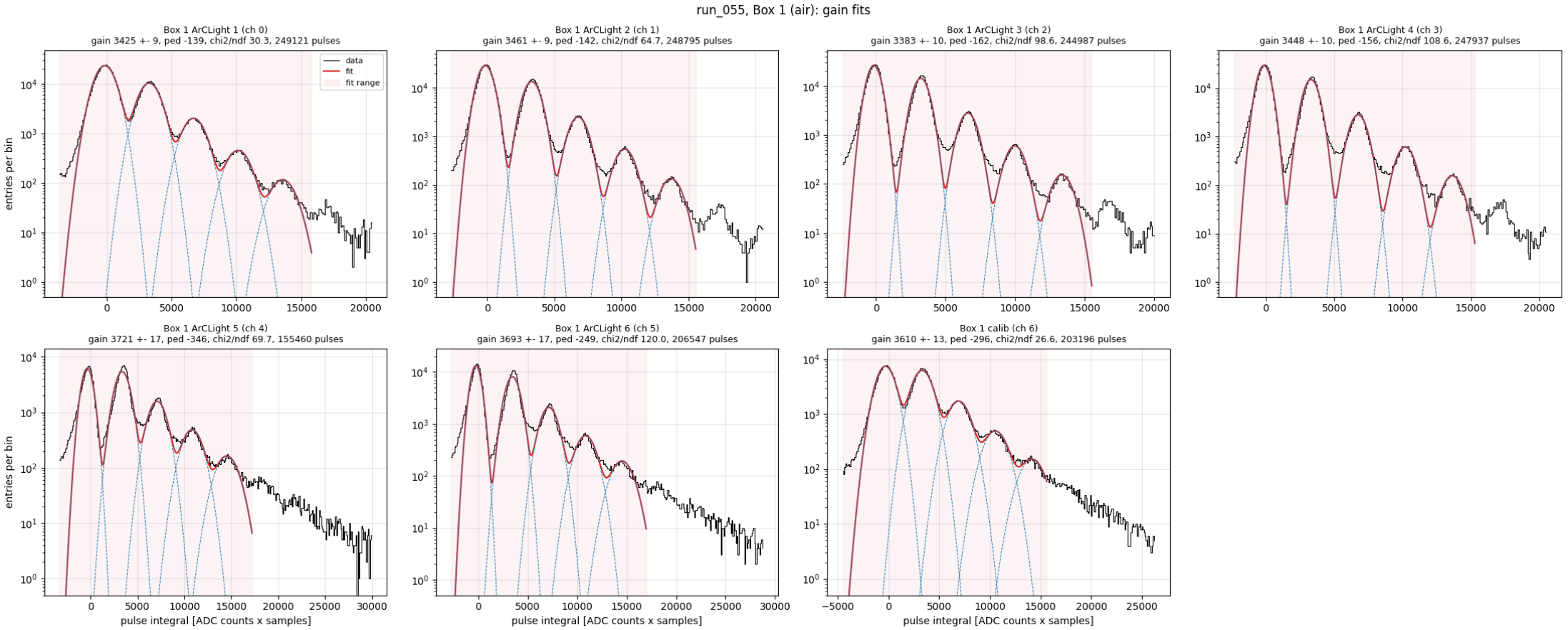
SiPM calibration to remove the temperature dependent change

- Isolate dark count peaks per event per Sipm
- Intagrate peaks and create fingerplot
- Fit gaussian to find gain
- Plot gain corrected ratio
- Plot gain vs temperatur

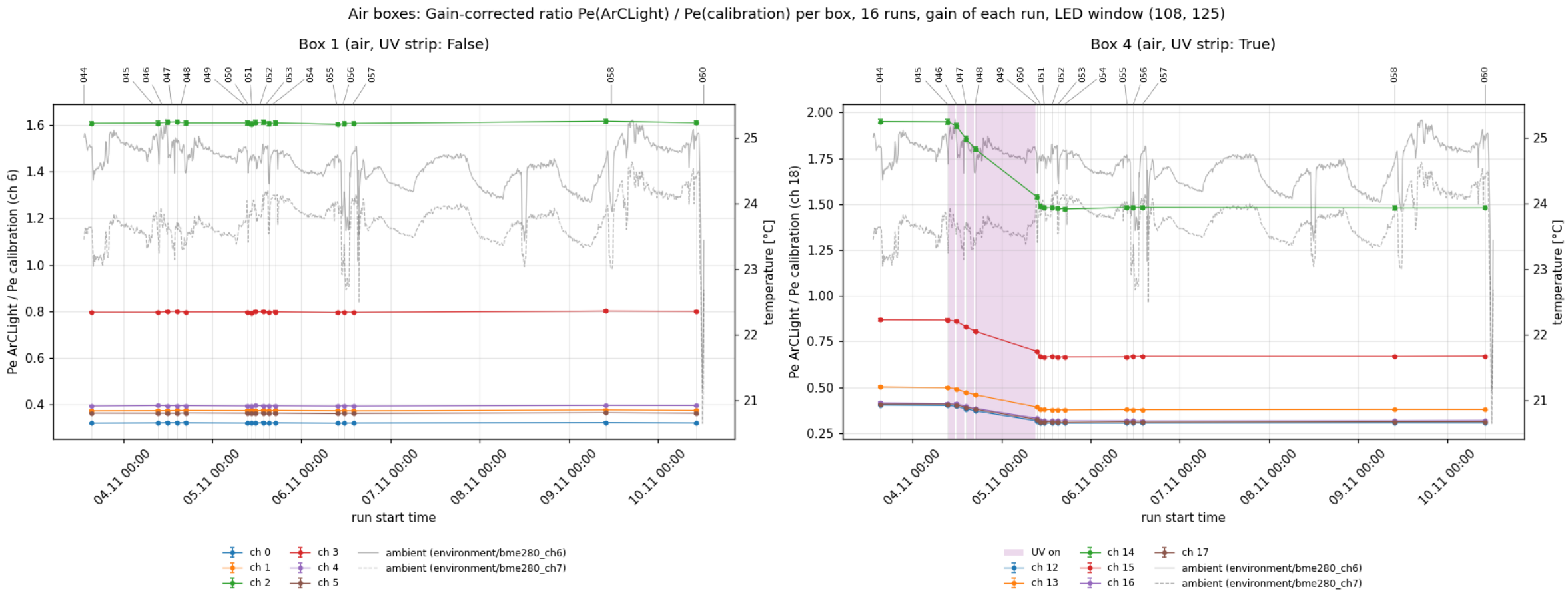
Isolation of dark count peaks



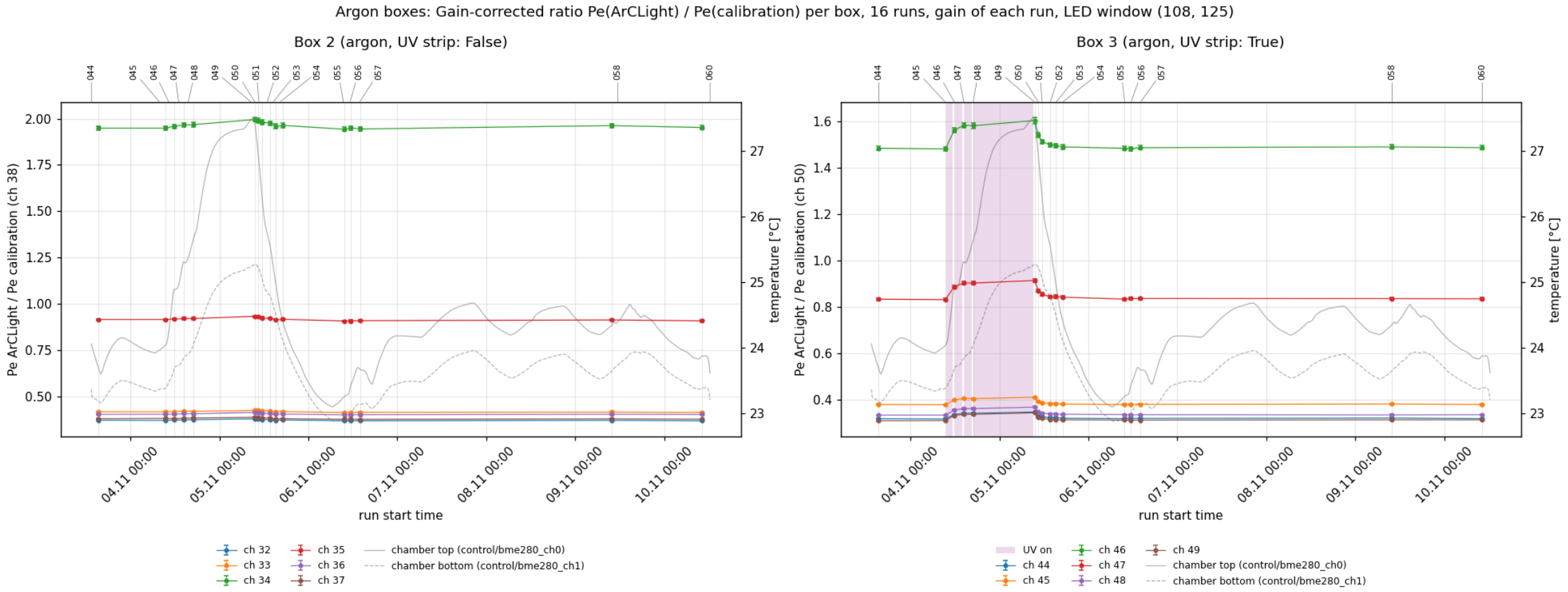
Fingerplots and gaussian fitting



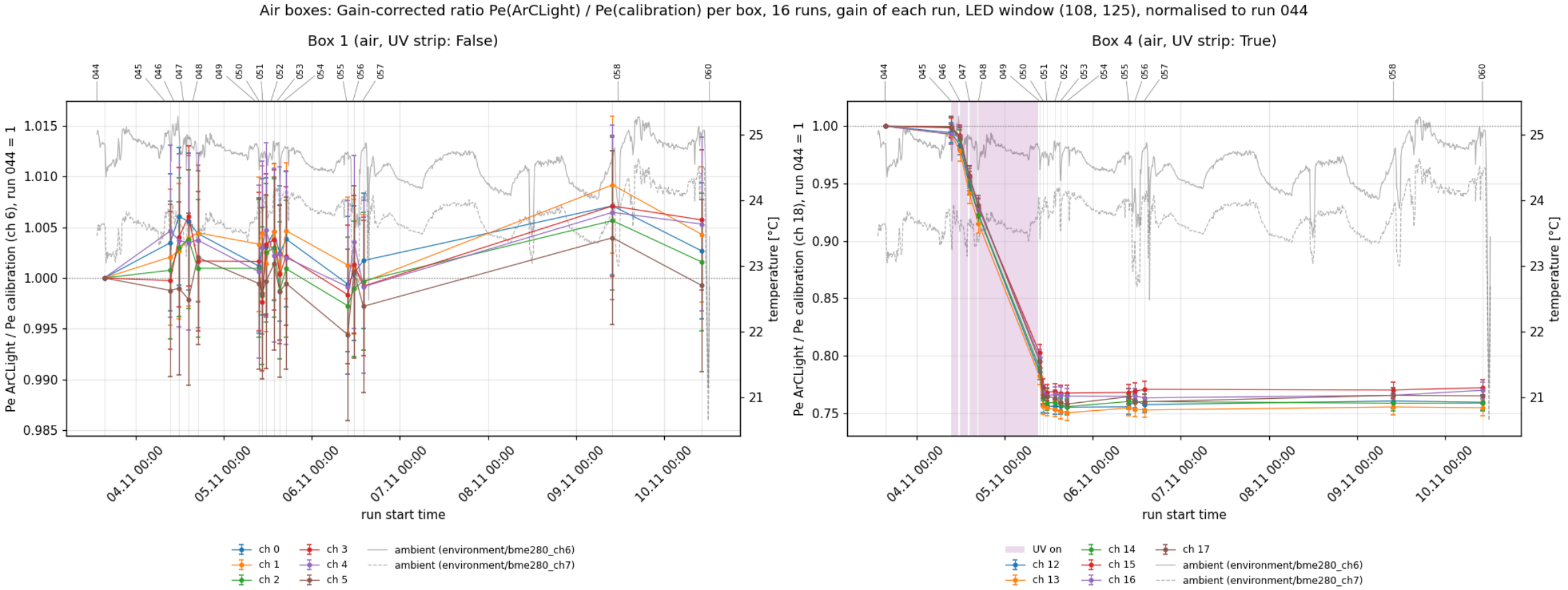
Gain corrected ratio (Air)



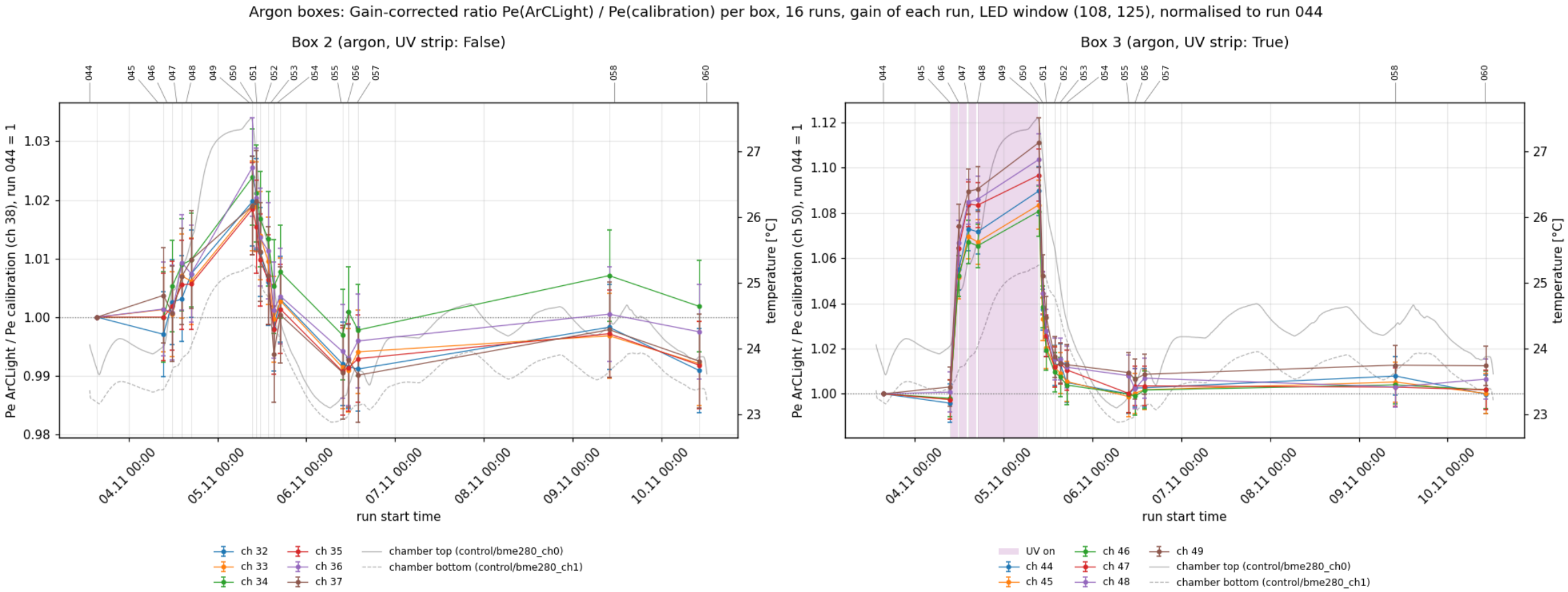
Gain corrected ratio (Argon)



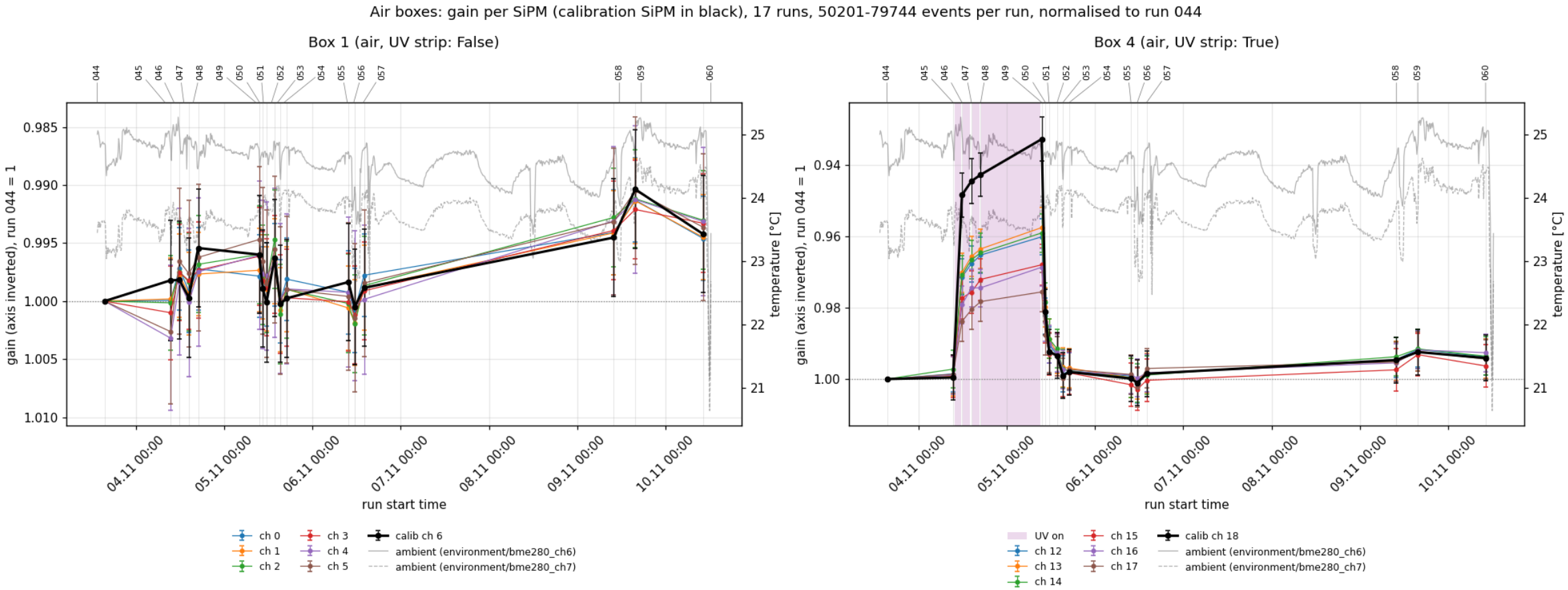
Gain corrected ratio (Air normalised)



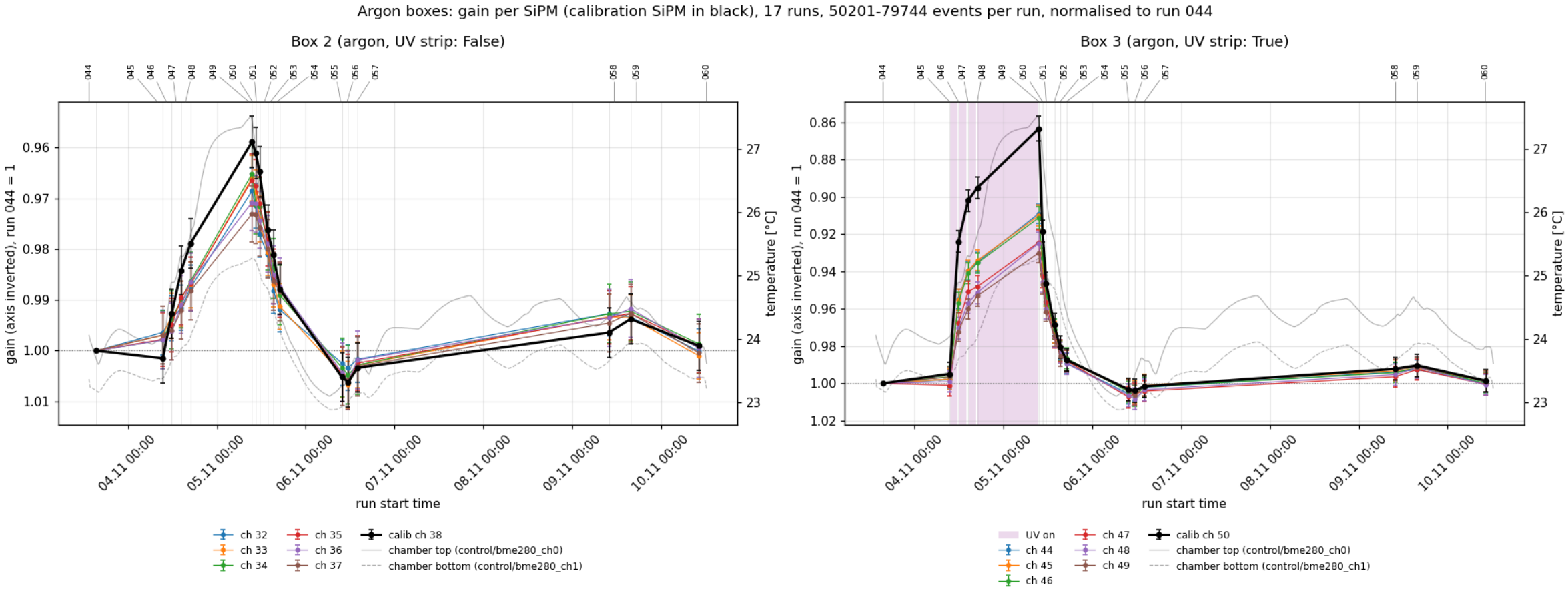
Gain corrected ratio (Argon normalised)



Gain vs temperature (Air normalised to run 44)



Gain vs temperature (Argon normalised to run 44)



Still persistent temperature dependencies

Possible causes (needs further investigating):

- PDE (photon detection efficiency)
  - Since fixed Bias (57 V) → Falls with temperature, but differently for different Wavelengths
  - ArcLight SiPMs vs Calibration SiPMs → change in ratio
- Pulser LED spectrum shift → absorbs slightly differently
- TPB changes
  - Some studies for cryogenics vs room T → For our T change probably insignificant.

Further measurement plan

- Covering / improving covering of boxes to further increase lighttightness
- Doing another measurments series with UV (similar to run 45-57)
- If possible in Week 16th to 20th 2D scan of the (at least the UV blasted) ArcLights to see gradient.

Rought Thesis outline

- Introduction
- DUNE detector and ArcLights
- SiPMs and SiPM calibration (theory)
  - How do they work
  - Gain / fingerplots
- Setup and measurement process
  - Setup
  - Vacuum test / sensor data
  - measurement process
- Results
- Discussion
- Conclusion